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RED DEER MANAGEMET (CERVUS ELAPHUS L.) IN REPUBLIC SLOVENIA: THE PROBLEMS, RECENT TRENDS AND PERSPECTIVES

Miha ADAMIČ*

The past strategy of red deer population management on the recent territory of Slovenia is discussed in the article. The present distribution and density of this game species in Slovenia are a consequence of optimal suitability of habitats in managed forests, absence of great predators and late - red deer friendly - hunting legislation. The previous rigid system of solving of local environmental problems (connected with increased densities of red deer) started to fail, when extensive decline of forests broke out and when - together with it - a necessity appeared for faster regeneration of forests. Problems of this kind reduce to a great degree the life possibilities of red deer. Because of that, the previous rigid system of protection should to be replaced by more flexible bio-political strategy of red deer population management.

Key words: red deer, population management, bio-political strategy, Slovenia

UPRAVLJANJE POPULACIJ JELENJADI (CERVUS ELAPHUS L.) V REPUBLIKI SLOVENIJI: PROBLEMI IN PERSPEKTIVE

Izvleček

Prispevek kritično obravnava dosedanjo strategijo upravljanja populacij jelenjadi na današnjem območju Slovenije. Današnja razširjenost in gostota te divjadi v Sloveniji sta posledici optimalne primernosti habitatov v gospodarjenih gozdovih, odsotnosti velikih plenilcev ter dosedanje, jelenjadi naklonjene lovske zakonodaje. Dosedanji togi sistem reševanja lokalnih problemov v okolju, povezanih z povečanimi gostotami jelenjadi, je pričel odpovedovati ob pojavu obsežnejšega propadanja gozdov ter potrebi po njihovi hitrejši obnovi. Zaradi tovrstnih problemov, ki v precejšni meri ožijo življenjske možnosti jelenjadi, bo potrebno klasični sistem varstva nadomestiti z elastičnejšo biopolitično strategijo upravljanja populacij jelenjadi.

Ključne besede: jelenjad, upravljanje populacij, biopolitična strategija, Slovenija

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1 INTRODUCTION AND SHORT HISTORY OF RED DEER MANAGEMENT ON RECENT TERRITORY OF REPUBLIC SLOVENIA

By the variety of its natural conditions, Slovenia is one of the leading countries in Europe. The changing landscape, wide spread forests and the geographical position at the meeting Alpine, Mediterranean, Pannonian and Dinaric regions, create natural conditions with characteristical diversity of fauna and - within it - the wildlife variety as well.

Today's ranges and densities of wildlife in Slovenia is a resultant of the natural conditions, the past legislation, the unequal levels of socio-economic development in different regions and the traditional relations of human population towards wildlife and towards animals in general. The recent quantity and distribution of wildlife differ significantly from its density and distribution in past. If the changes are studied more thoroughly it is quite evident, that the events within wildlife populations in Slovenia were to a great degree similar to the events in the major part of Europe and North America (Mueler-Using 1960, Strandgaard 1965, Kraft 1964, Formozov 1971, Adamič 1974, 1976, Schroeder 1977, Gruell 1986, Myrberget 1990, etc.). The changes are clearly seen in the increasing number and in spreading of the great herbivores and - on the other hand - in the regression or even vanishing of the species, dwelling in large old-growth forests and of the species, living in the mosaic-like environment of the old farming countryside.

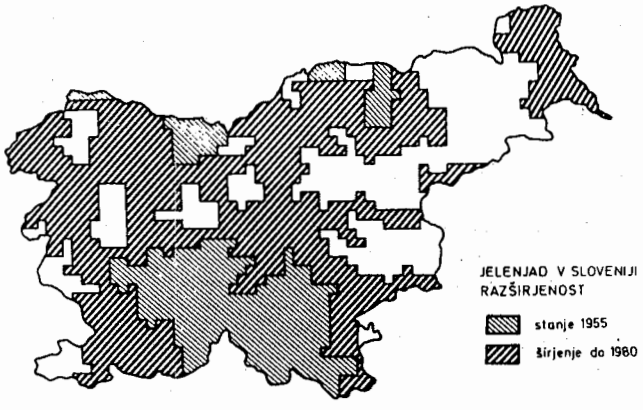

Figure 1: Former (1955) and recent (1980) distribution of red deer in Republic of Slovenia

The changes are normally presented as harvest of individual wildlife species in a longer period of time. In the last years, they reached such an extent (Table 1), that it is impossible for them to be a mere result of direct human influence on wildlife populations, or in other words - to be a result of hunting only.

Table 1: A comparison of harvest for some species of wildlife in recent Slovenia in the years 1900 - 1904 and 1980 - 1984. The data for an area of 1000ha, (10km^2), are shown in the table (Adamič, 1986).

Species	1900 - 1904		1980 - 1984	
	average/ 1000ha	index	the average	index
Roe deer	3,9	100	14,9	382
Red deer	0,02	100	1,5	7500
Chamois	0,3	100	1,0	330
Boar			0,9	
Field hare	9,1	100	5,2	57
Field partridge	5,2	100	0,6	11
Fox	1,5	100	3,8	250

Such differences in density, and with it also in harvest, can only be explained by changes in "carrying capacity" of habitats, which are the consequence of changes in the environment. With the notion of "carrying capacity" (Dasmann 1964, Bailey 1984), the upper level of population growth with consideration to the environmental capacity is defined. The carrying capacities of habitats of great herbivores are determined first of all by the quantity and quality of the available food and by the protective conditions. The carrying capacity is therefore not a constant, but changes all the time. As the human changes the environment, he influences its carrying capacity in the sense of space and time, short-term or long-term; due to the human influence, the carrying capacity could be increased or decreased. An increased carrying capacity of habitats is not enough to induce progressive growth of wildlife populations; the major environmental resistances, which influence the populations' growth negatively, have to be suppressed or at least moderated as well. The main - so called - environmental resistance are the great predators (wolf!) and the way and intensity of hunting. The grounds for progressive growth of populations of red deer and some other great herbivores in the 20th century in Slovenia, could therefore be found in the combined influence of higher carrying capacities of habitats and moderated environmental resistances (Adamič 1974, 1976, 1986, 1990).

The autochthone red deer population in Slovenia was considerably large - beside the written sources (Schollmayer 1889, Fabjan 1956, Župančič 1957, Simonič 1958, 1972 and some others), also the preserved antlers of the deer shot in the areas of Kočevje and Notranjski Snežnik give evidence about that. But in the period of anarchy after the revolutionary year of 1948, the whole population was almost completely exterminated.

In the end of 19th century began the restocking of Slovene territory with red deer, caught in various parts of the Austro-Hungarian monarchy - yet these animals' vigour did not match the vigour of the local Slovene deer. According to the abovementioned authors, the Austro-Hungarian red deer were brought to the following game reserves:

- Kokra (1888) and Jelendol (1891 - 1894) in Gorenjska,
- the game reserve of Haasberg Castle by Planina and the reserve Leskova dolina in the forests of Snežnik (1899). When the wildlife reserve Leskova dolina was opened, the not numerous autochthone deer, that persisted in the forests of Snežnik, joined the released animals.

In the end of 19th century, red deer were also kept in the game reserves Lukanja on Pohorje, on Uršlja gora and by the Bogenšperk Castle in Zasavje.

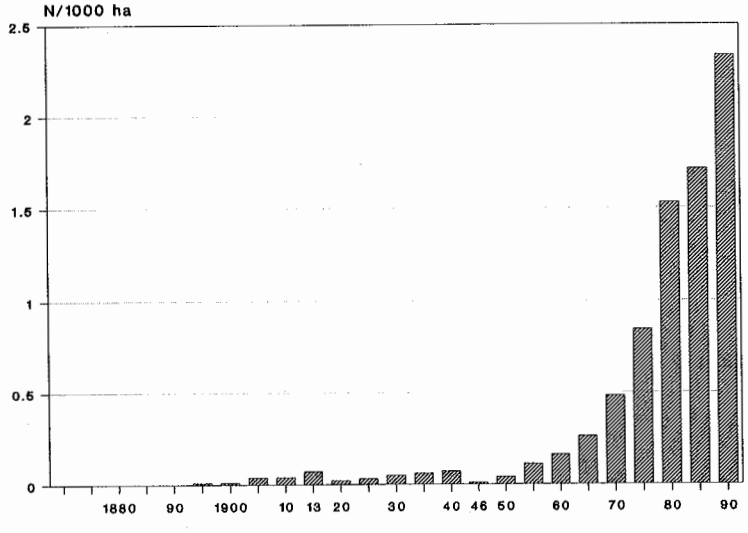

Figure 2: Dynamics of red deer harvest on the recent territory of Slovenia in the period 1875 - 1990 (N/1000ha)

Up to the year of 1900, very few deer were shot on the recent territory of Slovenia, but afterwards the harvest began to increase gradually. Already before the first world war, and even more noticeably after it, the red deer began to spread its range.

The second world war influenced the forming red deer populations badly. Because of that, with a Decree about the big game hunt inhibition, the red deer hunt was forbidden completely for 2 years (from January 1st 1946 till December 31st 1947).

From statistical data of the Hunting Association of Slovenia it is evident, that after 1950, the red deer populations began to grow again - mainly as a consequence of the to red deer friendly hunting legislation of that period and of the concrete protective measures in the breeding grounds of Kočevje, Notranjska, Pohorje and Karavanke, which had all been formed in purpose of systematic protection and management of red deer.

The density and harvest of red deer were increasing significantly fast after 1970. After Hlavaty (1980), the red deer harvest in the period 1969 - 1979 was increasing at an average annual rate of 11.5%, and within this period, from 1974 - 1979 even at the average rate of 14.2%.

Simultaneously with the growing red deer populations, that were evidently not mastered by harvest (Figure 3), the problems of negative impact of red deer and other herbivores to natural regeneration of forests began to appear (Gašperšič 1974, Perko 1977, 1980, 1981). For Slovenia, such problems are very worrying, because 70 - 75% of the Slovene forests should be regenerated naturally (Mlinšek, 1982).

2 THE BASES OF RED DEER MANAGEMENT AFTER THE YEAR OF 1970

As a great consumer, red deer is an important ecological factor, with a considerable influence upon the producer - vegetation. The characteristical generalistic feeding strategy of (Hofmann 1978, Bubenik 1984), enables the red deer populations to spread from central parts of their former habitats and to settle in new ones successfully. According to the Statistical Evidence of the Hunting Association of Slovenia, the harvest of red deer in the period 1977 - 1986 was 29.422 animals. If also the 2716 animals, that died naturally or were lost for some other reasons (the registered loss!) are added to this numbers, we come to a total of 32.138 eliminated animals. The average annual nonhunting losses for this period (see Table 2) reach 8.4% of all dead animals, and vary between 3.5% and 15.2% per year. These results show, that harvest is the major cause of mortality of red deer in the absence of big predators (wolf!).

The man - hunter is the major cause of recent mortality and the regulatory factor of red deer population dynamics. Very similar conclusions could also be derived from the data about harvest in the state game reserve Jelen (see Figure 4).

It is rather difficult to define the causes of red deer nonhunting mortality for the whole territory of Slovenia, yet this can be done for smaller areas - locally. From the data about red deer losses in the area of Jelen in the period 1981 - 1986 (6 years - Berce 1987: 24) it can be seen, that 62.2% of the deer (181 animals) were killed by

great predators - wolf and lynx. Only 34.8% of loss can be regarded as a consequence of unfavourable winter conditions and other reasons (Figure 5).

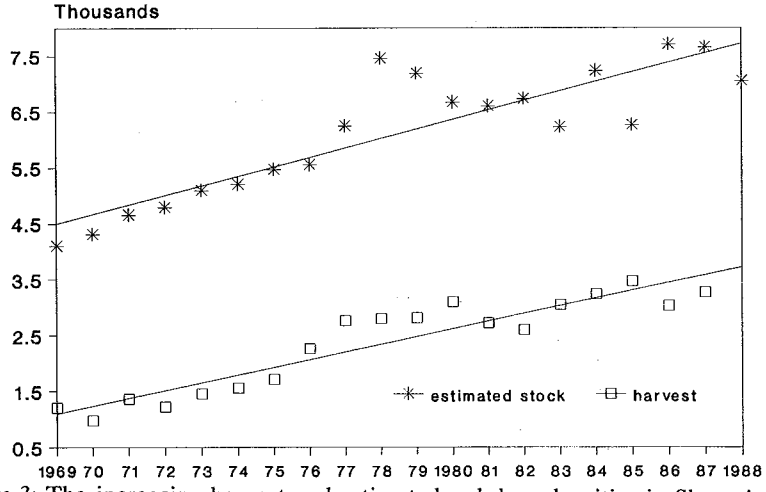

Figure 3: The increasing harvest and estimated red deer densities in Slovenia after 1969.

Table 2: The harvest and the registered red deer losses in Slovenia for the period of 1977 - 1986 (from Statistical Evidence of LZS)

The year	Harvest	Nonhunting mortality	Together	% of losses
1977	2601	267	2868	9,3
1978	2800	187	2987	6,3
1979	2817	208	3025	6,9
1980	3098	311	3409	9,1
1981	2723	417	3140	13,3
1982	2601	136	2737	5,0
1983	3046	191	3237	5,9
1984	3237	338	3575	9,5
1985	3472	126	3598	3,5
1986	3027	535	3562	15,2
Total	29422	2716	32138	

Avarage annual losses (%) $\bar{x} = 8.4 \pm 3.7\%$

Although the winter climatic conditions and the general suitability of red deer wintering areas in Kočevje are more favourable than those in the area of Jelen (the above-sea altitude, exposition, tree variability and forest cover, etc), the data from the state game reserve Medved (Kočevje) show, that the most important reason of red deer mortality there are winter losses. It is not easy to judge about the causes of such a difference, yet most probably the main reason is a different density of red deer populations in the mentioned two areas. The density differences could be clearly seen from the results of systematic red deer observation, which was carried out within the investigation of the summer habitats selection in the summers of 1980 and 1981.

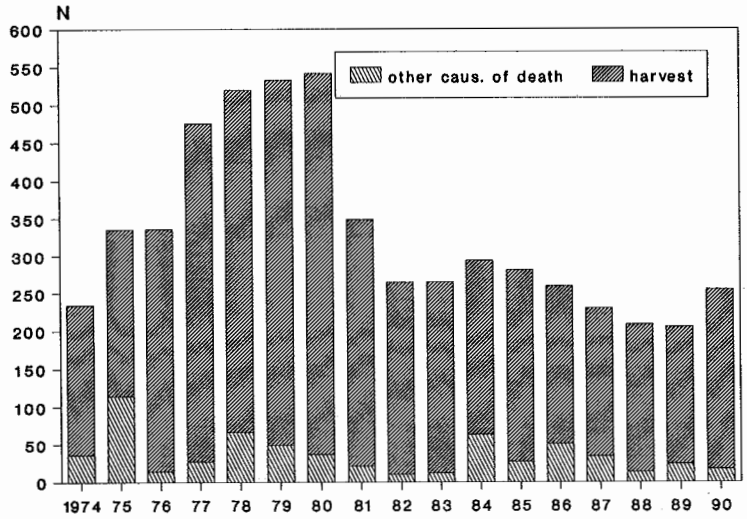

Figure 4: The harvest and the registered red deer losses in the area of Jelen in the period 1974 - 1990 (from the Annual review of red deer management and harvest, Notranjsko LGO 1976 - 1990)

According to our instructions, the hunters from the areas of Jelen and Medved, carried out the systematic observation of red deer populations (Table 3).

From Table 3, the characteristical difference in number of deer, observed per one observation day, can be seen. On the basis of the trends of some measurable environmental parameters and parameters connected to red deer populations it can be induced, that deer density in the area of "Jelen" has decreased after 1976 (Adamič, Kotar 1983, Berce 1987). On the other hand, the falling trends of equal, identically measured parameters in Kočevje (Adamič, 1982), point to the increasing densities of deer in the area of "Medved". Relatively high winter losses, which - in spite of the optimal suitability of the winter habitats - occur in Kočevje every a bit more severe winter, are most probably connected with high deer population density and with unselective hunting. The too short hunting season and the ways of hunting, reduce the opportunities for coordination of harvest - its extent and the suitable age

and sex structure of culled animals. Because of the irresponsible shooting of milk hinds, the orphaned youngs only have little chances to survive in severe winter conditions. The level of winter losses can so be significantly increased by unreasonable harvest. In future it could be expected for these undesired effects to grow together with the increasing harvest, in case the present, too short hunting season is not prolonged.

Table 3: The results of systematical red deer observation, carried out in the game reserves "Medved" in Kočevsko and "Jelen" in Notranjska (April - October 1980 and 1981).

Game reserve	The number of observation days	Total number of observed deer	The number of deer per observation day $\bar{x} \pm SD$
"MEDVED"	205	833	4,3 ± 4,0
"JELEN"	136	378	2,8 ± 1,9

In the period of growing red deer populations in the sixties and seventies, the deer spread over large areas of Slovenia (see Figure 1). Beside the too low harvest in central areas, the causes for this should also be seeked in the former politics of the Slovene Hunting Organization and in the towards deer friendly hunting legislation of that period, which had not (yet) taken into consideration the signs of decreasing bioecological stability of Slovene forests (Gašperšič 1987). Beside the air pollution, cuttings and weather rigours, also the herbivore animals contributed locally to the bioecological instability of forests.

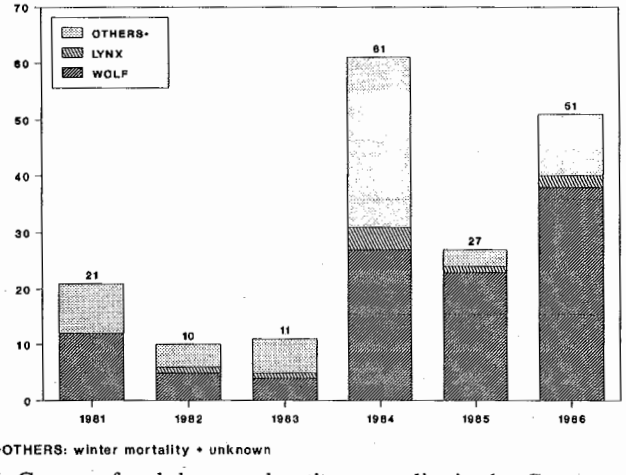

Figure 5: Causes of red deer nonhunting mortality in the Game reserve Jelen - Snežnik in the period 1981 - 1986 (source: Berce 1987)

The management system (zonation) for red deer, which was prepared after the resolution in the Parliament of SR Slovenia about the hunting legislation in 1985, was directed to fast salvation of local consequences of high densities of red deer populations. The main characteristic of this management system was divison of the Slovene territory to regions, suitable for red deer management and to regions, unsuitable for it (in other words - the regions where no deer populations should exist). But as the management system was prepared without necessary professional basis and without agreement of the hunting organizations from the "no deer" regions, it could not contribute much to the proper red deer population management in Slovenia. Furthermore, the zonation also provoked unwanted side effects. With the bureaucratic regulation of spatial frames and intensity of protection and management, the red deer is being pushed in a kind of "Indian reserves", which will in future - due to some further spatial activities - become even more split and narrowed, or the already mentioned activities will - for their own purpose - lessen the suitability of these habitats for wildlife and their carrying capacity as well.

The non-professional basis of the management system (zonation) is well evident in the provision, that the average spring density of deer in central areas should not exceed 2 animals per 100ha of forest. In the area of Kočevje, the harvest of red deer in 1985 in three game reserves, with joint area of 57.406ha of forest, was 1154 animals - that is 2 deer per 100ha. That is exactly as much, as the target number of red deer in this area should be. There is no doubt, that the density of population, which in spite of consideration of the age and sex structure still allows so great a harvest, is significantly higher, as the official estimations are.

We estimate, that red deer densities in central areas will still for a long time exceed the planned 2 animals per 100ha of forest surface. Yet an important question arises, whether it is more reasonable to maintain lower red deer densities on larger areas or to limit the red deer areas and maintain higher local population densities there. Long-term, the first option is certainly better. Maintenance of lower population densities causes less unwanted side effects, especially those of overbrowsing and bark-stripping of forest trees. There are less troubles by the execution of harvest, the costs of feeding are smaller and it is easier to harmonize the various spatial interests. On the other hand, the second solution - the greater density - even accelerates all the mentioned problems.

High densities of red deer and other ungulates in multifunctional forests are not desired nor reasonable. Already Kraus (1985) had stressed, that even moderate red deer densities of 1.5 animals per 100ha, cause decline of plant diversity. Yet, the deer influence becomes much more evident by the densities greater than 3 animals per 100ha. According to the same author, the first to decline are the biomass and the diversity of broad-leaved trees, dwarf shrubs and forbs. As the forbs have no time to finish flowering and to seed, they gradually vanish. At the same time, the cover and biomass of grasses increase. Higher red deer densities therefore lead to gradual worsening of food conditions and decreasment of environmental carrying capacity. Schauer (1976), Perko (1977, 1978), Edgerton (1987), Hanley, Hanley (1987) and some other authors also remind us of the regression processes in plant

communities, caused by too great densities of red deer and other herbivores. And Perko (1986) as well reports, that in the forests of Snežnik, the biomass of herbs and shrubs and the quantity of tree shoots increased simultaneously with the increased red deer harvest in the period 1976 - 1986.

And there is one even more important reason for the choice of lower red deer density. The changing goals of rural economy and the growing problems of forest decline will in future cause additional pressure for further lowering of densities of deer populations also in the zonated areas. Mayer (1985) warns, that the densities of high herbivores, which are still tolerable in healthy, stabile forest, are resolutely too big for the pollution affected forests. In such forests - by opinion of the same author - it is of a vital importance to ensure the rejuvenation of all tree species, especially the broad-leaved trees, which are less affected by the imissions as the conifers are. Perko and colleagues (cit. Jež 1987) announce, that the share of fir within the forest growing stock will decrease - due to the fir dieback - from 51% to only 13% in the period of 1985 - 2030. The absence of fir will have to be compensated with an increased share of broad-leaved trees (which are hardly browsed by cervids) and by additional spruce planting.

If the actual degree of air pollution of Slovene forests is taken into consideration (Šolar 1987), it is most likely, that there will be more demands for further lowering of densities of red deer and other ungulates in the future.

3 AN UNCLEAR VISION OF THE FUTURE DEVELOPMENT OF RED DEER POPULATIONS IN SLOVENIA

The changing, defensive politics of hunting organizations, the already announced changes of hunting legislation and the growing pressures because of forest decline make it difficult to foretell, what the future red deer population dynamics in Slovenia will look like. Increased harvest in central parts will most probably obstruct further spreading of red deer to the border areas. Yet, the majority of questions remain unanswered. On the unsufficient professional basis built management system (zonation), which spatially frames the management and hunting of red deer on only one half of the recent territory of this species, is not a very firm guarantee for a long-term red deer populations' management. For a reasonable management of red deer and some other "problematic" game species, it would be necessary for the biopolitical strategy to be introduced by decision-making.

Biopolitics (Peek et all 1982) is a spatially defined compromise of biological characteristics of a species, environmental conditions and human intentions of individuals and organizations to use the environment (within the statutory frames, of course). After thorough fulfillment of this dynamic strategy, the rigid frames of the present management system (zonation) will no longer be necessary.

The future of red deer in Slovenia depends on the success of incorporation of the biopolitical strategy of this species' management into the concept of the modern,

multifunctional forest management. If we are determined to control the complicated relations between red deer and its habitats, and to follow the trends with suitable measures, a very sensitive system of control mechanisms should be built, which would enable us to supervise the events and to decide about the system and intensity of interventions into red deer populations and their habitats.

For all this, much more knowledge is necessary as we today have, much more tolerance and understanding of the happenings around us.

4 LITERATURE

ADAMIČ, M. 1974. /Zahlenschwankungen der Populationen wichtiger Wildarten in Slowenien in der letzten Hundert Jahren beurteilt nach den Schwankungen des Abschusses./ Zbornik Bioteh.fak. UL Vet 11/1-2: 15-53. Ljubljana 1974.

ADAMIČ, M. 1976. Zaraščanje, odločilni dejavnik razširjenosti in številčnosti nekaterih vrst divjadi na območju degradiranih gozdov na Krasu Slovenskega Primorja. Simpozijum o lovstvu (zbornik referatov): 185-197. Beograd 1976.

ADAMIČ, M. 1982. Prehranske značilnosti jelenjadi (Cervus elaphus L.) in srnjadi (Capreolus capreolus L.) v Kočevskem, Notranjskem in Krimskem lovskogojitvenem območju: 1-73. Inštitut za gozdno in lesno gospodarstvo Ljubljana, 1982.

ADAMIČ, M. 1986. The land use changes in Slovenija and their influence on range and density of some wildlife species. Proc. 18th World IUFRO Congress, Div.1/2: 588-600. Ljubljana 1986.

ADAMIČ, M.1990. /Food habits as an element of the management of ungulate populations with the emphasisis on the red deer (Cervus elaphus L.)./ Strokovna in znanstvena dela 105. Inštitut za gozdno in lesno gospodarstvo in VTOZD za gozdarstvo BF: 1-203. Ljubljana 1990.

ADAMIČ, M., KOTAR, M. 1983. Analiza gibanja telesne teže in teže rogovja jelenjadi in srnjadi v lovišču Jelen-Snežnik v letih 1976-1980. Zbornik gozdarstva in lesarstva 22: 5-78. Ljubljana 1983.

BAILEY, J.A. 1984. Principles of wildlife management. J.Wiley and Sons, 1-373. New York 1984.

BERCE, M. 1987. Gospodarjenje z jelenjadjo v LGO Notranjske v letu 1986 in predhodnih letih. Pregled gojitve in lova jelenjadi v lovskem letu 1986 (katalog): 1-30. Notranjsko LGO, Snežnik 1987.

BUBENIK, A. 1984. Ernaehrung, Verhalten und Umwelt des Schalenwildes: 1-272. BLV Verlag. Muenchen 1984.

DASMANN, R.F: 1964. Wildlife Biology. J.Wiley and Sons. 1-231. New York 1964.

EDGERTON, P.J. 1987. Influence of ungulates on the development of the shrub understory of an upper slope mixed conifer forest. Proc.Symp. Plant-Herbivore Interactions: 162-167. USDA Forest Service GTR-INT 222. Ogden UT. 1987.

FABJAN, I. 1956. Snežniška jelenjad. Lovec 39: 161. Ljubljana 1956.

FORMOZOV, A.N. 1971. Wood-skirts of the sparse steppe woodlands as a factor of game wildlife in european Soviet Union. Trans. 10th Congress IUGB: 119-123. Paris 1971.

GAŠPERŠIČ, F. 1974. Zakonitosti naravnega pomlajevanja jelevo-bukovih gozdov na visokem krasu Snežniško-Javorniškega masiva. Disertacija. Biotehniška fakulteta UL, Inštitut za gozdno in lesno gospodarstvo: 1-133. Ljubljana 1974.

GAŠPERŠIČ, F. 1987. Temeljni principi polifunkcionalnega gozdnogospodarskega načrtovanja. Gozdarski vestnik 45: 265-276. Ljubljana 1987.

GRUELL, C.E. 1986. Post-1900 mule deer irruptions in the Intermountain West: Principle causes and influences. USDA For.Serv., GTR INT-206: 1-23. Intermt.Forest and Range Exp.Stn., Ogden, UT 1986.

HANLEY, T.A.,Hanley,K.A. 1987. Physical and chemical response of understory vegetation to deer use in southeastern Alaska. Canadian Journal of Forest Research 17: 195-199.

HLAVATY, M. 1980. Odstrel in stalež divjadi v Sloveniji-1964-1980. Prikazi in študije 24/7-8: 88-96. Ljubljana 1980.

HOFMANN, R.R. 1978. Die Stellung der europaeischen Wildwiederkaeuer im System der Aesungstypen. Wildbiologische Informationen fuer den Jaeger 1: 9-18. Enke Verlag, Stuttgart 1978.

JEŽ, P. 1987. Možnosti povečanja prehranske zmogljivosti za jelenjad v Snežniškem masivu s sečnjo jelke v zimskem času. Diplomska naloga. VTOZD za gozdarstvo Biotehniška fakulteta: 1-48. Ljubljana 1987.

KRAFT, A. 1964. Management of moose in a Norwegian forests. Papers of the Norwegian State Game Res.Inst. 2/16: 1-60. Orkanger 1984.

KRAUS, P. 1985. Vegetationsbeeinflussung, Schaelschadensintensitaet, und Wildbretgewichte als Indikatoren der relativen Rotwilddichte. Proc. 17th Congress IUGB: 967-978. Brussels 1985.

MAYER, H. 1985. Wild-Wald Wechselbeziehung als Indikator fuer den Funktionszustand des Oekosystems Gebiergswald unter natur naehen und naturfernen Bedingungen. Tagungsbericht Symp. Das freilebende Tier als Indikator fuer den Funktionszustand der Umwelt: 163-164. Wien 1985.

MLINŠEK, D. 1982. Konflikti med gospodarjenjem z gozdom in divjadjo v Sloveniji. Gozd-divjad (zbornik referatov): 41-54. VTOZD za gozdarstvo BF. Ljubljana 1982.

MUELER-USING, D. 1960. Grosstier und Kulturlandschaft: 1-157. Musterschmidt Verlag Goettingen 1960.

MYRVERGET, S. 1990. Wildlife management in Europe outside the Soviet Union. NINA Utredning 018: 1-47. Trondheim 1990.

PEEK, J.M.,Pedersen,R.J.,J.W.Thomas 1982. The future of elk and elk hunting. P.599-625 in J.W.Thomas and D.E.Towaill comp.: Elk of North America, Ecology and Management. Stackpole Books 1982.

PERKO, F. 1977. Vplivi divjadi na naravno obnovo jelovo-bukovih gozdov na Visokem Krasu. Gozdarski vestnik 35: 191-204. Ljubljana 1977.

PERKO, F. 1979. Odnosi med rastlinstvom in rastlinojedo divjadjo v ekosistemih Snežniških gozdov. Pregled gojitve in odstrela jelenjadi v lovskem letu 1978 (katalog): 1-11. Notranjsko LGO. Snežnik 1979

PERKO, F. 1980. Metode in prvi izsledki kvantificiranega vpliva divjadi na gozdno vegetacijo. Pregled gojitve in lova jelenjadi v lovskem letu 1979 (katalog): 1-26. Notranjsko LGO. Snežnik 1980.

PERKO, F. 1981. Odpravljanje težjih motenj pri gospodarjenju z gozdovi. Intenziviranje in racionalizacija gospodarjenja z gozdovi v SR Sloveniji (zbornik referatov): 169-182. VTOZD za gozdarstvo BF, Ljubljana 1981.

SCHAUER, T. 1976. Einfluss des Schalenwildes auf der Gebirgswald und seine Bodenvegetation. Jahrbuch 1976, 41.Band des Vereins zum Schutz der Alpenpflanzen und-Tiere e.V.: 145-158. Muenchen 1976.

SCHOLLMAYER, A. 1889. Die Jagd am Krainer Karste-Schwarz,Roth-und Raubwild im Besonders. Waidmans Heil 1889: 109, 123. Klagenfurt 1889.

SCHROEDER, W. 1977. Gutachten zur Behandlung der Wildtiere im Bereich des Nationalparks Berchtesgaden. Inst.fuer Forstpolitik und Forstliche Betriebswirtschaftslehre: 1-67. Muenchen 1977.

SIMONIČ, A. 1958. Jelenjad v Sloveniji. Lovec 41: 34. Ljubljana 1958.

SIMONIČ, A. 1972. Jelenjad-Lovske trofeje na Slovenskem: 72. LZS, Ljubljana 1972.

STRANDGAARD, H. 1965. Fluctuations and trends in Danish bag records. Trans.7th Congress IUGB: 575-584. Belgrade 1965.

ŠOLAR, M. Razsežnosti propadanja gozdov v slovenskem prostoru-stanje 1987. Črna knjiga o propadanju gozdov v Sloveniji leta 1987: 19-21. Inštitut za gozdno in lesno gospodarstvo, Ljubljana 1987.

ŽUPANČIČ, J. 1957. Jeleni v bogenšperških ogradah. Lovec 40: 405-406. Ljubljana 1957.